



Department of Pesticide Regulation



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MEMORANDUM

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DATE: August 13, 2007

SUBJECT: VENTURA COUNTY ACREAGE REDUCTION ESTIMATES

Introduction

This memorandum documents the procedure for estimating potential Ventura County acreage reductions due to the Department of Pesticide Regulation's (DPR's) recently proposed limitations on fumigant use. The calculation procedure uses 2004 data, and estimates are derived for three different scenarios:

- Emissions calculated with no field adjustment factors
- Emissions calculated using the recently proposed application method adjustment factors (AMAF) and Method Use Fractions (MUF) applicable to 2004 Ventura County fumigant applications (Barry et al., 2007)
- Emissions calculated using "low emission" application method AMAFs and MUFs recently reported by Barry et al. (2007) as applied to 2004 Ventura County data

Assumptions

The estimation procedure employed here implicitly assumes:

- The relative use of different fumigants is fixed according to the 2004 Ventura County use report, regardless of scenario
- 2004 fumigant use data is representative of current and future years
- Any Ventura County acreage to which fumigants were applied in 2004 would be retired from production if regulatory restrictions prevented fumigant applications (as opposed to, for instance, relying on alternate methods of pest control or alternate crops planted)

As such the procedure is highly conservative, almost certainly providing high-biased estimates of acreage reductions.



Emission and acreage data

For the fumigants methyl bromide, 1,3-dichloropropene, chloropicrin, metam-potassium, metam-sodium, dazomet, and sodium tetrathiocarbonate, 2004 use data were downloaded from DPR's 2004 pesticide use report (PUR) Oracle database. (July 2, 2007). The fumigant emission data could not be taken from the October 2006 volatile organic compound (VOC) inventory (Roush, 2006) because data on "acres treated" needed for these calculations are not available in the VOC inventory.

A SAS program was then written (Appendix 1) for post download processing of the fumigant PUR data. The purpose of the post-download processing in SAS was to insure that the fumigant PUR data were treated exactly as they would have been during VOC inventory calculation, while also retaining the "acre-treated" data field for each fumigant data record. Specifically, the SAS program

- Screened the fumigant PUR use data to eliminate site codes that should not be included in the VOC inventory
- Screened the fumigant PUR use data for invalid meridian/township/range/section (MTRS) coordinates
- Assigned those fumigant PUR use data with legitimate MTRS coordinates to administrative areas (e.g. nonattainment areas)
- Assigned those fumigant PUR use data without valid MTRS coordinates to different use type categories (i.e. right of way, commodity fumigation, or landscape maintenance) according to PUR application site, and then allocate those distributed application types to the correct administrative areas (Appendix 1)

Following these data processing steps, the fumigant use data were merged with product composition information from the Label database to obtain pounds of each fumigant active ingredient (A.I.) applied in each application, and emission potentials were applied to generate the nonadjusted emissions from each application. The emission potential for these fumigant products are 100% for methyl bromide, chloropicrin, 1,3-dichloropropene, and dazomet. Metam sodium and metam potassium product emission potentials are expressed on a methyl isothiocyanate equivalent basis, given by $0.566 \times \text{A.I. percentage}$ and $0.503 \times \text{A.I. percentage}$, respectively (Spurlock, 2002). Sodium tetrathiocarbonate product emission potentials are expressed on a carbon disulfide basis as $0.4087 \times \text{A.I. percentage}$ (Spurlock, 2006). Finally, emissions associated with each application were calculated and used to construct Table 1 along with AMAF and MUF data from Barry et al., 2007. The procedure outlined above is identical to that used to calculate estimates of field adjusted fumigant emissions in Barry et al. (2007).

Randy Segawa
August 13, 2007
Page 3

Conclusion

The total Ventura County acreage treated with fumigants in 2004 was 14284 acres. Under the simplifying assumptions outlined at the beginning of this memorandum, estimates of acreage reduction range from approximately 5800 acres to 7500 acres (reduction of 40%–52% of 2004 treated acreage) for the field adjusted emission scenarios (Table 1), up to a high of 10200 acres (reduction of 71%) for the scenario with unadjusted emissions. This latter scenario reflects current procedures used to calculate the inventory.

Attachments

References

Barry, T., F. Spurlock, and R. Segawa, 2007. Pesticide volatile organic compound emission adjustments for field conditions and estimated volatile organic compound reductions—initial estimates, DPR memorandum to John S. Sanders, Ph.D. April 6, 2007. Source: <http://www.cdpr.ca.gov/docs/emppm/pubs/ehapreps/analysis_memos/1903_Sanders.pdf>.

Roush, T. 2006. October 24, 2006, memorandum to John S. Sanders, Ph.D.: 2006 Update To The Pesticide VOC Inventory: Estimated Emissions 1990–2004. <<http://www.cdpr.ca.gov/docs/pur/vocproj/vocinvent06.pdf>>.

Spurlock, F. 2006. July 18, 2006, memorandum to John S. Sanders, Ph.D.: 2006 Revisions to Procedures for Estimating Volatile Organic Compound Emissions from Pesticides. <http://www.cdpr.ca.gov/docs/pur/vocproj/voc_calc_revision071805.pdf>.

Spurlock, F. 2002. Methodology for determining VOC emission potentials of pesticide products, memorandum to John S. Sanders, Ph.D. January 7, 2002. <<http://www.cdpr.ca.gov/docs/pur/vocproj/intro.pdf>>.

Table 1. Estimated acreage reduction under three scenarios based on 2004 Ventura County data. Total acres treated with the five fumigants = 14284 acres

SCENARIO	Total emissions (tpd)^A	goal (tpd)^A	nonfumigant emissions (tpd)^A	fumigant emissions (tpd)^A	mean lbs fumigant emissions per treated acre^B	required emission reduction (lbs)^B	acres out of production^C
2004 no field adjustment	9.310	3.132	0.637	8.673	222.2	2261148	10175
2004 w/ field adjustments	4.818	2.633	0.637	4.181	107.1	799710	7465
2004 w/ field adjusted - low emission methods	3.981	2.633	0.637	3.344	85.7	493368	5758

^A tons per day; from Table 21 (unadjusted) and Table 23 (field adjusted) in Barry et al. (2007).

^B lbs emissions = tpd * 2000 * 183 days; calculated as [sum all fumigant emissions]/[14284 acres treated]; note that nonfield fumigant emissions (e.g. commodity fumigations, and nursery containers) were negligible (<0.03% fumigant emissions).

^C = [required reduction (lbs)]/[mean fumigant emissions per acre (lbs/acre)].

APPENDIX 1 – SAS program for creating and processing fumigant PUR dataset

```

/*****
SECTION I
FILE REFERENCES
*****/

A. Input files
*****/

FILENAME 04PURdat 'H:\randy_04.dat';
FILENAME ns_admin 'e:\03voc\in_csv\new_abadnaa.csv';
FILENAME abadnaa 'e:\03voc\in_dat\new_statewide_AB_NAA.dat';
        /*new AB and NAA boundaries added for Kern and Riverside Counties
        in February 04*/

/*IMPORT PUR ORACLE DOWNLOAD*/
data pur04;LENGTH comtrs $ 11 growerid $ 11;
infile 04PURdat DLM='~';
input useno prodno date $ lbsprd acres unit $ site co comtrs $ recordid $
growerID $ site_loc $;
run;

proc sort data=work.fumeprod;
by prodno;

proc sort data=pur04;
by prodno;

data fumes04;
merge pur04 (in=used) fumeprod (in=fumi);
by prodno;
if fumi;
if used;
run;

/*****
TEST IF IN INVENTORY: invoc=1 means in the inventory
                        invoc=0 means no
*****/

data fumel; set fumes04;
IF ((site GE 151 and site LE 55500) or
(site GE 55502 and site LE 59999) or
(site GE 60001 and site LE 61501)
or site in (10, 30, 40, 60, 80, 90, 91,99,
65000, 65021,65031,66000,66002, 67000,67001,67002,
67003,68009,69000, 71000,72000,77004,90504))
Then invoc=1;
else invoc=0;run;

/*data tmp; set fumel; if invoc=0;
proc print; run;*/

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data fume2; set fume1;
if invoc=1;
drop invoc;

/* NOW convert all spatial data with incorrect spatial coordinates to
nonspatial data,
    where ALL nonspatial data are assigned comtrs='99A99A99A99' */
DATA mtrs_chk;
    SET fume2;
        MTRSflag=0;
    IF substr(comtrs,1,2)>0 and substr(comtrs,1,2)<59 and
        substr(comtrs,3,1) in ('H','M','S') and
        substr(comtrs,4,2)> 0 and substr(comtrs,4,2)<49 and
        substr(comtrs,6,1) in ('N','S') and
        substr(comtrs,7,2)> 0 and substr(comtrs,7,2)<48 and
        substr(comtrs,9,1) in ('E','W') and
        substr(comtrs,10,2)>0 and substr(comtrs,10,2)<37
    THEN MTRSflag=1;
run;

DATA fume3;
    SET mtrs_chk;
    IF MTRSflag =0 THEN comtrs = '99A99A99A99';
    DROP MTRSflag;
run;
/*****
III. Process nonspatial PUR data:
    allocate VOC emissions in each nonspatial record
    to proper administrative areas (NAA, AB, AD)

    NOTE:
        cslm = commercial structural & landscape maintenance
        row  = rights-of-way
        cfum = commodity fumigation

    DATASET passed = nonspatial7
*****/

DATA nonspatial;
    SET fume3;
    IF comtrs= '99A99A99A99';
PROC SORT; BY co;
run;

DATA abadnaa;
    INFILE ns_admin firstobs=2 DLM=',';
    INPUT abadnaa $ AB ad naa co cslmfrac rowfrac cffrac index;
    PROC SORT; BY co;
DATA abadnaa1; set abadnaa; IF index=1;
DATA nonspatial1;
    MERGE nonspatial (IN=indat) abadnaa1 (IN=indis);
    BY co;

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```

        IF (indat and indis);
run;

DATA abadnaa2; set abadnaa; IF index=2;
DATA nonspatial2;
    MERGE nonspatial (IN=indat) abadnaa2 (IN=indis);
    BY co;
    IF (indat and indis);
run;

DATA abadnaa3;set abadnaa; IF index=3;
DATA nonspatial3;
    MERGE nonspatial (IN=indat) abadnaa3 (IN=indis);
    BY co;
    IF (indat and indis);
run;

DATA abadnaa4;set abadnaa; IF index=4;
DATA nonspatial4;
    MERGE nonspatial (IN=indat) abadnaa4 (IN=indis);
    BY co;
    IF (indat and indis);
run;

DATA abadnaa5; set abadnaa; IF index=5;
DATA nonspatial5;
    MERGE nonspatial(IN=indat) abadnaa5 (IN=indis);
    BY co;
    IF (indat and indis);
run;

DATA abadnaa6; set abadnaa; IF index=6;
DATA nonspatial6;
    MERGE nonspatial (IN=indat) abadnaa6 (IN=indis);
    BY co;
    IF (indat and indis);
    PROC APPEND BASE=nonspatial1 DATA=nonspatial2;
    PROC APPEND BASE=nonspatial1 DATA=nonspatial3;
    PROC APPEND BASE=nonspatial1 DATA=nonspatial4;
    PROC APPEND BASE=nonspatial1 DATA=nonspatial5;
    PROC APPEND BASE=nonspatial1 DATA=nonspatial6;
run;

/*****
    CALCULATE DISTRIBUTED APPLICATIONS for "nonspatial" data, 3
categories:
    cslm - commercial structural and landscape apps.
           defined as sites 10, 61001, 63000, 72000, 67003
    ROW - rights of way - site 40
    cfume - commodity fumigation - ALL other sites > 89 are classified
           as commodity fumigations
*****/

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```

DATA nonspatial7;
  SET nonspatial1;
    year=substr(date,5,4);
  mo=substr(date,1,2);
  IF (site=10 or site=61001 or site=63000 or site=72000
    or site=30 or site=67003)
  THEN cslmflag=1;ELSE cslmflag=0;
  IF site=40 THEN rowflag=1;ELSE rowflag=0;
  IF (site NE 61001 and site NE 63000 and site NE 72000
    and site NE 67003)
    AND site>89 THEN cfumflag=1;ELSE cfumflag=0;
    cslm_lbs=cslmflag*cslmfrac*lbs;
    row_lbs=rowflag*rowfrac*lbs;
    cfum_lbs=cfumflag*cffrac*lbs;
    sumlbs=cslm_lbs+row_lbs+cfum_lbs;
    lbs=sumlbs;

run;

PROC SORT; BY prodno;

/*****
IV. Process spatial PUR data:
    assign NAA, AD, AB designations to PUR records
    where NAA=nonattainment area, AB=Air Basin, AD=Air District
    DATASET passed = spatial1
*****/

DATA spatial; SET fume3;
  IF comtrs NE '99A99A99A99';
  PROC SORT; BY comtrs;

run;

/* next dataset is a lookup table that has AB,AD,NAA
  designations for each CoMTRS in the state*/
DATA districts;LENGTH comtrs $ 11;
  INFILE abadnaa;
  INPUT AB 1-5 AD 7-10 NAA 12-13 Co 15-17 comtrs 20-32;
  DROP Co;
  PROC SORT;BY comtrs;

run;

DATA spatial1;
  MERGE spatial (IN=used) districts;
  BY comtrs;
  IF used;
    year=substr(date,5,4);
    mo=substr(date,1,2);

run;

/*****
V. PREPARE OUTPUT

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merge spatial and nonspatial datasets
define "ozone season" flag (months 5-10 = ozone season,
    Oseason=1)
*****/
DATA join_dat; set spatial1;
    PROC APPEND BASE=join_dat DATA=nonspatial7 FORCE;
run;

DATA DONE;set join_dat;
    IF (site=10 or site=61001 or site=63000
        or site = 67003 or site=72000)
    THEN aguse=0;
    ELSE aguse=1;
    IF (mo=5 or mo=6 or mo=7 or mo=8 or mo=9 or mo=10)
        THEN Oseason=1;
        ELSE Oseason=0;
run;

/*EXPORT TO EXCEL*/

```